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EFFECT OF CERVICOLABYRINTHINE IMPULSATION ON THE SPINAL REFLEX APPARATUS

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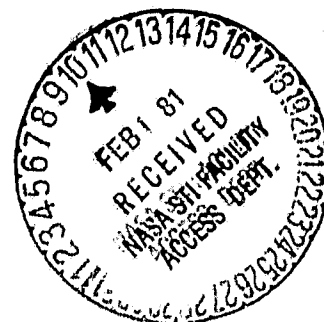
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16. Abstract In view of the fact that the convergence effect of vestibular impulsion may both stimulate and inhibit intra- and intersystemic coordination of physiological processes, an attempt was made to define the physiological effect on the spinal reflex apparatus of the convergence of cervicolabyrinthine impulsion on a model of the unconditioned motor reflex as a mechanism of the common final pathway conditioning the formation and realization of a focused beneficial result of human motor activities. More than 100 persons subjected to rolling effect and angular acceleration during complexly coordinated muscular loading were divided according to typical variants of the functional structure of the patella reflex in an experiment requiring 30 rapid counterclockwise head revolutions at 2/sec with synchronous recording of a 20 item series of patella reflex acts. The author's knee jerk coefficient was used in calculations. In 85% of the cases 2 patellar reflexograms show typical braking and release of knee reflex and 1 shows an extreme local variant. The diagnostic and prognostic value of these tests is suggested for determining adaptive possibilities of functional systems in respect to acceleration and proprioceptive stimuli.			
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## EFFECT OF CERVICOLABYRINTHINE IMPULSATION ON THE SPINAL REFLEX APPARATUS

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The current concept in respect to the mechanisms of cervicolabyrinthine affer- /1838\*  
entation is associated with the discovery of the complex processes of integration and convergence that occur at various levels of the central nervous structures when affected by the factor of acceleration [1-5, 7]. The latter is often coupled with intense disturbance to the motoneurons localized both in the upper and lower portions of the central nervous system. We know that the convergence effect of vestibular impulsation may act both as stimulator and inhibitor of intra- and intersystemic coordination of physiological processes [6].

It was considered important to define the physiological effect on the spinal reflex apparatus of the convergence of cervicolabyrinthine impulsation on a model of the unconditioned motor reflex as a mechanism of the common final pathway conditioning the formation and realization of a focused beneficial result of human motor activities.

In more than 100 persons, systematically subjected to the effect of rolling waves and angular acceleration during complexly coordinated muscular loading, a division was made of typical variants in respect to the functional structure of the patella reflex and these subjects were studied for the effect of cervicolabyrinthine impulsation in an experiment that requires 30 rapid revolutions of the head counterclockwise at the rate of 2/sec with synchronous recording of a 20 item series of patella reflex acts. Recording of the patella reflex was done with a sensor that transformed the mechanical energy of calf movements into electric signals that activated an N-349 ink stylus apparatus.

In order to express quantitatively the relationship between stimulating and inhibiting processes in the test using the 20 item series evoking patella reflex acts

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\* Numbers in the margin indicate pagination in the foreign text.

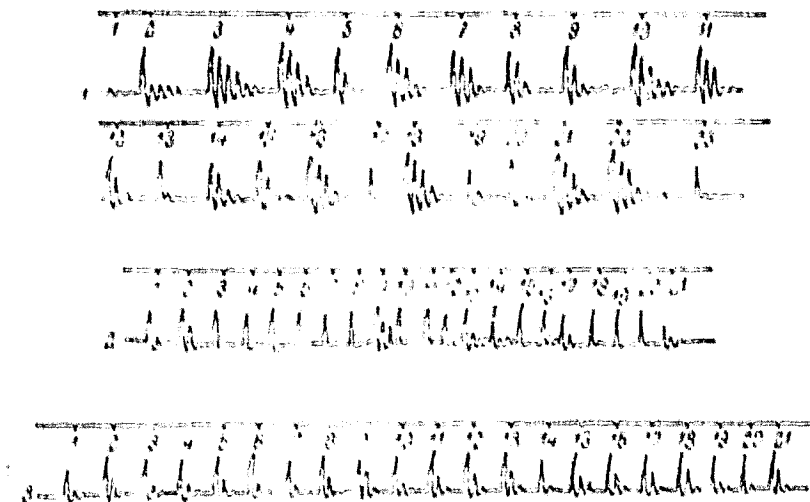


Fig. 1. Patellar reflexograms characterizing labyrinthine braking of the knee reflex during test involving 30 rapid rotations of the head against a background of initial preferential release of the reflex. 1 - before labyrinthine test, 2 - during test, 3 - three min after test.

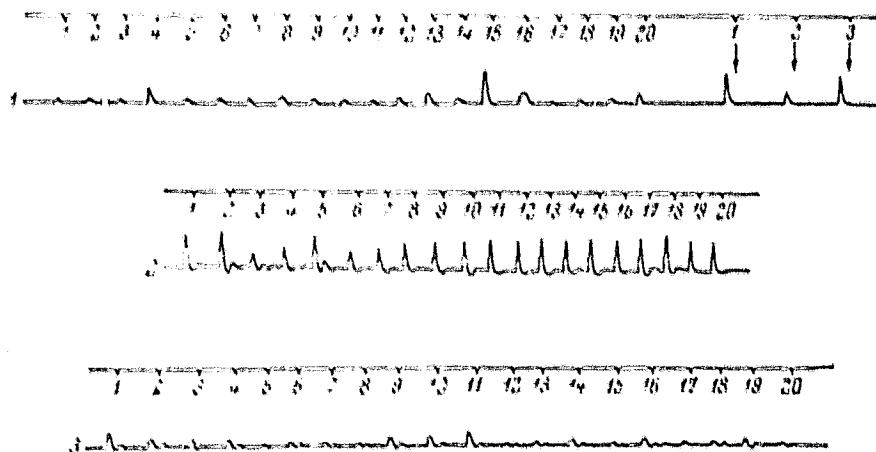


Fig. 2. Patellar reflexograms illustrating labyrinthine release of the knee reflex during test involving 30 rapid rotations of the head against a background of initial braking of the reflex. 1 - before labyrinthine test, 2 - during test, 3 - three min after test; arrows show reflex acts during Yendrassik test.

a calculation was made of the knee jerk coefficient proposed by us comprising the quotient of the total number of knee jerks in respect to the number of blows dealt to the patella tendon. In the presence of the genetic (balanced) form of the patella reflex this coefficient was approximate or equal to 2.0. The knee jerk indices that were less than 1.0 in our research were classified as variants of the functional structure of the patella reflex with dominance of the inhibitory process, whereas values greater than 3.0 were interpreted as showing predominance of the stimulatory process. A definite value was given to the absolute figures for the number and amplitude of individual reflex knee jerks. In respect to the coefficient data the present research was carried out over a range of 1.0-4.4 units.

The study of the dynamics of the functional structure of the patella reflex during rapid rotation of the head made it possible to detect a definite relationship between the dynamic shifts of the patella reflex under conditions of cervicolabyrinthine impulsation and the type of background activity of the patella reflex arc. The reflex picture is one of braking and release and the structure that reflects the brake-on state of the reflex is accompanied by the brake-off condition (Figures 1, 2). It is important to note that the braked and released quality of the functional structure of the patella reflex in the phase of background activity is found to be proximate in equal portions within the limits of up to 85% of the cases studied. Correspondingly the equilibrium level for the activity of the centers of the patella re- /1839

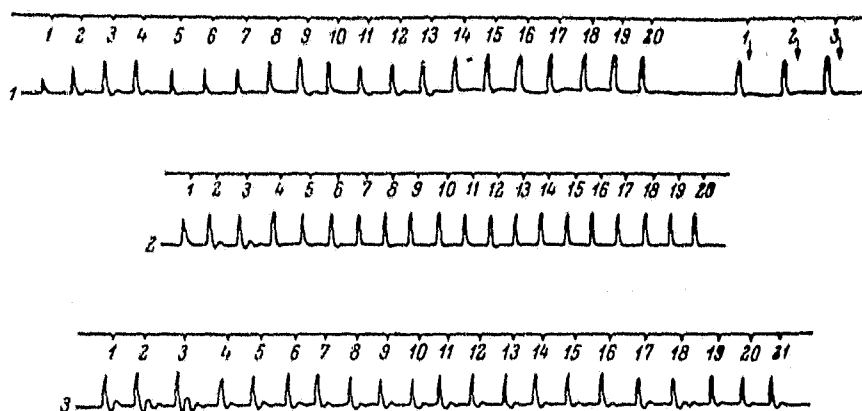


Fig. 3. Patellar reflexes reflecting resistance of functional structure of knee reflex during 30 rapid rotations of the head traced on the relatively balanced initial reflex background. 1 - before labyrinthine test, 2 - during test, 3 - three min after test; arrows show reflex acts at time of Yendrassik test.

flex arc in the phase of background activity varies within the limits of 15%. Even rarer (up to 5%) is the stable form of functional structure for the patella reflex in respect to the effect of cervicolabyrinthine afferentation, which must be regarded as the most complete variant of local reaction on the part of the spinal reflex apparatus to cervicolabyrinthine stimulation (Fig. 3).

Thus we see that a study of the effects of cervicolabyrinthine impulsation on the functional condition of the spinal reflex apparatus has a certain diagnostic and prognostic value in respect to the characteristics of the functional stability of the cervicovestibulospinal reflex mechanism and may be used in the way indicated to determine the adaptive status and adjustment possibilities of functional systems /1840 connected with reaction to the factor of acceleration and proprioceptive stimuli. An appropriate device for disturbing these systems is a series of measured circular head movements combined with vestibular and cervical proprioceptive afferentation.

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